

## **REMARKS**

### **Status of the Claims**

Claims 1, 3-7, and 10-18 are currently pending in the application.

### **Interview**

Applicants would like to thank Examiner Langel for the courtesies extended to Applicant's representative, Carol L. Cole, at the personal interview on Monday, June 7, 2010. The substance of the interview is incorporated into the comments below. As indicated on the Examiner Interview Summary Record, "an agreement was reached that all the claims appear allowable over Oroskar et al."

### **Rejection Under 35 U.S.C. § 102(e)/103(a)**

Claims 1, 3-7 and 10-18 are rejected under 35 U.S.C. § 102(e), or in the alternative 103(a), as being allegedly unpatentable over U.S. Patent No. 7,022,306 to Oroskar et al. (hereinafter "Oroskar"). Applicants respectfully traverse the rejection for the reasons of record as well as those presented below.

#### **102(e)**

In order to anticipate a claim, a reference must contain all elements of the claim. See *Hybritech v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 1379, 231 U.S.P.Q. 81, 90 (Fed. Cir. 1986). Further, a single source must disclose all of the claimed elements "arranged as in the claim." See *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 1236, 9 U.S.P.Q.2d 1913, 1920 (Fed. Cir. 1989). The law requires identity between the claimed invention and the prior art disclosure. See *Kalman v. Kimberly-Clark Corp.*, 713 F.2d 760, 771, 218 U.S.P.Q. 781, 789 (Fed. Cir. 1983).

As discussed at the interview, Oroskar does not teach a process comprising contacting methanol and hydrogen peroxide ... in the presence of a catalyst ... to initiate a reaction between said methanol and said hydrogen peroxide to produce said gas, as presently recited. Instead, Oroskar teaches a laundry list of oxygenates at col. 1, lines 49-52 and col. 5, lines 48-53. However, the inclusion of methanol in a laundry list does not arise to the level of strict identity between the claimed invention and the prior art disclosure.

Moreover, Oroskar does not teach a catalyst in metallic form selected from the group consisting of nickel, cobalt, copper, silver, iridium, gold, palladium, ruthenium, rhodium, and platinum, as presently recited. Instead, Oroskar teaches a laundry list of catalysts at col. 5, line 55 – col. 6, line 5, with further descriptions at col. 6, lines 49-62. Again, however, the inclusion of the claimed Markush of catalysts does not arise to the level of strict identity between the claimed invention and the prior art disclosure.

Further, Oroskar does not teach a process of contacting methanol and hydrogen peroxide in the presence of a catalyst to initiate a reaction between the methanol and hydrogen peroxide. This will be discussed in more detail below.

For at least these reasons, Oroskar does not anticipate the claimed invention. Reconsideration and withdrawal of this aspect of the rejection are respectfully requested.

103(a)

The Examiner argued that Oroskar discloses a process and apparatus for producing hydrogen by reacting an oxygenate and hydrogen peroxide in the presence of a transition metal catalyst, wherein the oxygenate may be an alcohol. See Office

Action dated November 14, 2008, at page 2, citing col. 1, lines 46-61 and paragraph bridging cols. 5-6. The Examiner also argued that it would be obvious to select an alcohol as the oxygenate from the list disclosed at col. 5, lines 48-53 because one of ordinary skill in the art would expect that any of the oxygenates recited in such list would function in the process. *Id.* at 2-3.

Moreover, the Examiner argued that Oroskar discloses that a gas product comprising about 30 volume percent of hydrogen was produced when ethanol was mixed with aqueous hydrogen peroxide in the presence of a manganese dioxide catalyst. See Office Action dated March 31, 2009 at 3. The Examiner concluded “that the ethanol inherently reacted with the hydrogen peroxide during such reaction” because the applicant’s specification “provides evidence that methanol reacts with hydrogen peroxide under such conditions to form hydrogen.” *Id.*

Further, the Examiner argued that the reference teaches that catalysts such as “cobalt, nickel, copper, platinum, palladium, and gold would catalyze the reaction between the methanol and hydrogen peroxide.” See final Office Action dated October 13, 2009, at pages 2-3 and cites col. 1, lines 56-61 and col. 6, lines 56-62 of Oroskar. This is a mischaracterization of the reference. In fact, the reference teaches at col. 6, lines 49-53, that the catalysts identified by the Examiner would decompose the hydrogen peroxide (oxidizer), but would not catalyze the reaction between the methanol and hydrogen peroxide. It is true that some of the same catalysts could be used to reform the ethanol (oxygenate), but it is not true that the reference teaches that the catalysts would catalyze a reaction between the methanol and hydrogen peroxide.

This is an important distinction because, as discussed below, there is no reaction between the ethanol and hydrogen peroxide or even methanol and hydrogen peroxide, as the Examiner asserts. The Examiner has failed to establish a prima facie case of obviousness because the reference fails to teach or suggest all of the claim elements. The Examiner has failed to establish that the reference teaches or suggests a process comprising, *inter alia*, contacting methanol and hydrogen peroxide in the presence of a catalyst to initiate a reforming reaction between the methanol and the hydrogen peroxide, as presently claimed.

To be clear, Oroskar teaches a process comprising mixing an oxygenate and an oxidizer in the presence of an initiator, wherein the "initiator is a mixture that comprises a first catalyst for decomposing the hydrogen peroxide and a second catalyst for catalytic autothermal reforming the oxygenate." Col. 1, lines 58-61, and col. 2, lines 1-3. A generic description of this process is described at col. 3, line 65 to col. 4, line 10. However, one of ordinary skill in the art reading the reference as a whole would understand that the process actually requires two reactions, as described in columns 1 and 2. In particular, a mixture of ethanol (oxygenate) and hydrogen peroxide (oxidizer) enter a first reactor 10 which holds a decomposition catalyst for decomposing the hydrogen peroxide (oxidizer). Col. 4, lines 10-15, Fig. 1, col. 6, lines 37-38, and col. 7, lines 54-58. This decomposition reaction decomposes the hydrogen peroxide (oxidizer) and generates heat and a first product stream 14, including water and oxygen. Col. 4, lines 17-19, Fig. 1, and col. 6, lines 40-43. The first product stream 14, containing the oxygenate and oxygen, **but no oxidizer**, is directed to a second catalyst bed holding a reforming catalyst, which reforms the ethanol and water to form a second product

stream 22, including a gas comprising hydrogen, carbon dioxide, and carbon monoxide. Col. 4, lines 19-24, Fig. 1, col. 6, lines 43-48, and col. 7, lines 59-64.

In fact, Oroskar teaches that the oxidizer must be decomposed in order to generate heat. This heat is then used to facilitate reforming of the oxygenate. Col. 6, lines 63-66. One of ordinary skill in the art would understand that the decomposition of the oxidizer is a necessary step in the Oroskar process because without it, he would need to provide heat from an external source, which is the problem he was trying to overcome. Col. 1, lines 15-40.

With regard to the Declaration, the Examiner argued that the results, i.e., that manganese dioxide catalyzed a decomposition of the hydrogen peroxide to water and oxygen, are not unexpected because Oroskar teaches this at col. 6, lines 49-55. The Examiner then argued that “[i]f anything is unexpected it would be that managanese dioxide *does not* catalyze the reaction between methanol and hydrogen peroxide to generate a hydrogen rich gas.” Final Office Action at page 3. However, this is exactly what the Declaration demonstrated.

Page two of the Declaration disclosed that a mixture of hydrogen peroxide and methanol (1:1) was flowed over a manganese dioxide catalyst resulting in O<sub>2</sub> and untreated methanol. Thus, the manganese dioxide did not catalyze the reaction between methanol and hydrogen peroxide to generate a hydrogen rich gas.

Moreover, a second experiment, had similar results. In particular, a mixture of hydrogen peroxide and methanol (3:1) was flowed over a manganese dioxide catalyst resulting in O<sub>2</sub> and methanol vapor. Thus, the manganese dioxide did not catalyze the

reaction between methanol and hydrogen peroxide to generate a hydrogen rich gas.

So, the results are unexpected.

Rather, it is only Applicant's process wherein hydrogen gas is produced following contacting hydrogen peroxide and methanol over the platinum metal catalyst.

As agreed to at the interview, the sentence at col. 5, lines 54 and 55, is merely a generic summary sentence regarding the two step process of Oroskar similar to the sentence at col. 1, lines 56-57. One of ordinary skill in the art reading the reference as a whole would understand that these are summary sentences at the beginning of each paragraph that provide the reader with a general description of the more detailed two stepped process which is described throughout.

Again, as agreed to at the interview, Oroskar does not teach or suggest a process comprising, *inter alia*, contacting methanol and hydrogen peroxide in the presence of a catalyst to initiate a reforming reaction between the methanol and the hydrogen peroxide, as presently claimed.

For at least all of these reasons, the reference does not render obvious the claimed invention. The Examiner has not established a *prima facie* case of obviousness. Reconsideration and withdrawal are respectfully requested.

### **Conclusion**

In view of the foregoing remarks, Applicants submit that this claimed invention not rendered obvious in view of the references cited against this application. Applicants therefore request reconsideration of the application, and the timely allowance of the pending claims.

Please grant any extensions of time required to enter this response and charge any additional required fees to our deposit account 50-3290.

Respectfully submitted,

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